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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/765,598 | 01/27/2004 | Horatio Quinones | NOR-1090A | 1733 |

37172 7590 09/23/2005

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EXAMINER

GEYER, SCOTT B

ART UNIT PAPER NUMBER

2812

DATE MAILED: 09/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/765,598

Applicant(s)

QUINONES ET AL.

Examiner

Scott Geyer

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 June 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-47 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4, 8-13, 19, 24-27, 31-36, 42 and 47 is/are rejected.
- 7) ☒ Claim(s) 5-7, 14-18, 20-23, 28-30, 37-41 and 43-46 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>062404</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Information Disclosure Statement

The reference cited within the IDS document received on June 24, 2004 has been considered.

Drawings

The drawings submitted on January 27, 2004 are acceptable.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1 and 24 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Galuschki et al. (6,057,178).

As to **claims 1-3, 13, 19, 24-26, 36, 42 and 47**: see figure 1, the abstract and column 3, lines 25-41.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and

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the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 4 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Galuschki et al. (6,057,178) as applied to claims 1 and 24 above respectively, and further in view of Malladi (6,436,737).

As to **claims 4 and 27**, Galuschki et al. teach all the limitations of claims 4 and 27, as cited above for claims 1 and 24, except for the passageway being offset from a geometric center of the component carrier. However, Malladi teaches an underfill passageway in a component carrier as shown in figure 4B which is offset from a geometric center. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the method of Galuschki et al. with an offset passageway as taught by Malladi so as not to interfere with the solder balls which attach the component to the component carrier.

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Claims 8, 9, 31 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Galuschki et al. (6,057,178) as applied to claims 1 and 24 above respectively, and further in view of Lance, Jr. et al. (5,697,148).

As to **claims 8 and 31**, Galuschki et al. teach all the limitations of claims 8 and 31, as cited above for claims 1 and 24, except for the passageway capacity having a volume less than a volume of underfill material required to underfill the gap. However, Lance, Jr. et al. teach a similar underfill process as shown in figures 4, 5 and 6. As can be shown especially in figure 4, the passageway (i.e. injection port) 26 has a much smaller volume capacity than the gap 40 between the die 12 and the substrate 14. It

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would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the method of Galuschki et al. with a passageway having a smaller volumetric capacity than the gap as taught by Lance, Jr. et al. so as to minimize the waste of encapsulant underfill material remaining in the passageway after the underfill process is completed. As to **claims 9 and 32**, Lance, Jr. et al. teach the underfill material 22 injected into the gap until the gap is filled with material.

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Claims 10 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Galuschki et al. (6,057,178) and Lance, Jr. et al. (5,697,148) as applied to claims 8 and 31 above respectively, and further in view of Lee (6,756,251).

As to **claims 10 and 33**, Galuschki et al. and Lance, Jr. et al. teach all the limitations of claims 10 and 33, as cited above for claims 8 and 31, except for placing a flow control barrier about the passageway before the underfill material is introduced into the passageway. However, Lee teaches placing a flow control barrier about the passageway before introducing the underfill material as shown in figures 10-12. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the method of Galuschki et al. and Lance, Jr. et al. with a flow control barrier as taught by Lee so as to force the underfill material into the gap and minimize waste of underfill material.

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Claims 11, 12, 34 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Galuschki et al. (6,057,178) as applied to claims 1 and 24 above respectively, and further in view of Lee (6,756,251).

As to **claims 11 and 34**, Galuschki et al. teach all the limitations of claims 11 and 34, as cited above for claims 1 and 24, except for placing a flow control barrier about the passageway before the underfill material is introduced into the passageway. However, Lee teaches placing a flow control barrier about the passageway before introducing the underfill material as shown in figures 10-12. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the method of Galuschki et al. with a flow control barrier as taught by Lee so as to force the underfill material into the gap and minimize waste of underfill material. As to **claims 12 and 35**, Lee teaches dispensing the flow control barrier about the passageway.

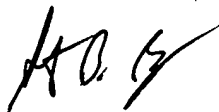
Allowable Subject Matter

Claims 5-7, 14-17, 20, 22, 23, 28-30, 37-40, 43, 45 and 46 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claims 18, 21, 41 and 44 are dependent upon objected claims.

Conclusion

The following references are cited as being particularly related to the applicant's invention: Fritz (6,734,540), Pu et al. (6,451,625), Akram et al. (6,048,656) and Akram et al. (5,766,982).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott Geyer whose telephone number is (571) 272-1958. The examiner can normally be reached on weekdays, between 10:00am - 6:30pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Lebentritt can be reached on (571) 272-1873. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

 9/20/05

Scott Geyer
September 20, 2005